Space Weather Technical Forecast

Issued on Friday, 12 November 2021 at 00:24 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant activity expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity was at Very Low levels, with occasional low B-class activity. There are currently three sunspot regions on the visible disc; AR2893 approaching the northwest limb and AR2894 in the southeast quadrant (both Hsx/Alpha) are mature and stable, unipolar sunspots. AR2895, in the northeast quadrant, was initially classified as a Dso/Beta but has simplified to become a Cro/beta to end the period with most of the penumbra disappearing.

No Earth-directed CMEs were observed in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind speed, as measured by DSCOVR was predominantly between 370-400 km/s, but during the evening increased to slightly elevated levels, peaking at 436 km/s at 11/2155 UTC. Density values were mainly average, although temporarily increased to above average around the middle of the day. Total IMF Bt was weak at mainly 3-6 nT, with an unremarkable north-south component Bz reaching -3nT. Phi angle was positive (away from Sun) until 11/1443 UTC when the phi angle changed to become negative (towards the Sun). Resultant geomagnetic activity was Quiet (Kp 0 to 2).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) as measured by GOES-16, remained at ambient levels. The high energy electron flux (greater than 2 MeV) was at moderate to background levels, peaking at 962 pfu at 11/1520 UTC. The 24-hour integrated fluence has remained below the Active threshold (1.0e8 integrated pfu) despite a slightly increasing trend, and the observed value at 11/2100 UTC was 2.89e7 integrated pfu.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be generally Very Low, with a chance of C-class flares.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs currently in the forecast. The solar wind speed is expected to be at background to occasionally slightly elevated levels, with the weak enhancements due to either weak coronal hole effects from the small CH18/- later in the period, or from a weak CME that may just brush Earth early in the period. Geomagnetic activity is expected to be mostly Quiet to Unsettled (Kp 0-3), and just a slight chance of isolated Active intervals (Kp 4), mainly from any possible weak coronal hole influence.

Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux is expected to be at or near background levels. The high energy electron flux (greater than 2 MeV) is expected to be mainly at moderate to background levels, but with a chance of temporarily breaching the High threshold of 1000 pfu during the peak of the diurnal cycle today.

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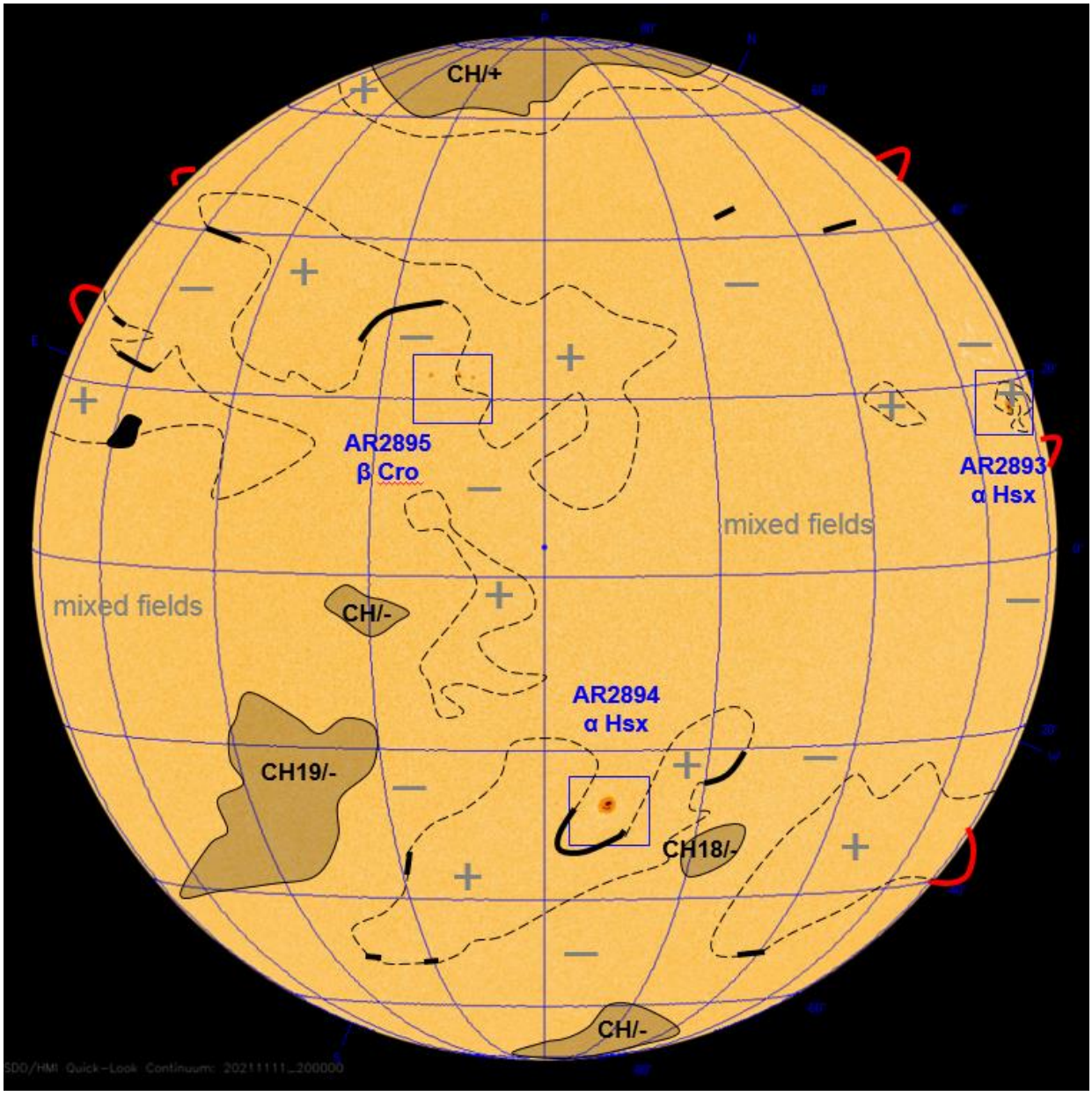
The corresponding 24-hour electron fluence is expected to continue on a steady or slightly upward trend, before declining towards the end of the period, whilst remaining below the Active (1e8 integrated pfu) threshold throughout.

Figure 1. Solar Analysis Valid 11/2000 UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

There are no Earth-directed CMEs currently in the forecast. The solar wind speed is expected to be at background to occasionally slightly elevated levels, with the weak enhancements due to either weak coronal hole effects or from a weak CME that may just brush Earth early in the period. Geomagnetic activity is expected to be Quiet to Unsettled (Kp 0-3), with just a slight chance of isolated Active intervals (Kp 4), mainly from any possible weak coronal hole influence. This is most likely from CH18, which has diminished in size over the past few days, and now appears to be a small and weak feature.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	3	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares:

Generally Very Low solar activity is expected, with a chance of C-class flares. There are currently three magnetically simple regions on the visible disc. Of these, AR2895 (Cro/Beta) in the northeast gives the greatest potential for any flare activity, having generated some B-class flares during the previous 24 hours.

Current far side STEREO EUVI imagery would suggest no significant active regions are likely to rotate onto the visible disc during the forecast period.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	3	3	3	3
Very Active	R3 to R5 X Class	No	1	1	1	1

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Solar Radiation Storms - (High Energy Protons):

No solar radiation storms are expected. The high energy proton flux (greater than 10 MeV) as measured by GOES-16, remained at ambient levels during the previous 24 hours, and no change is expected.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

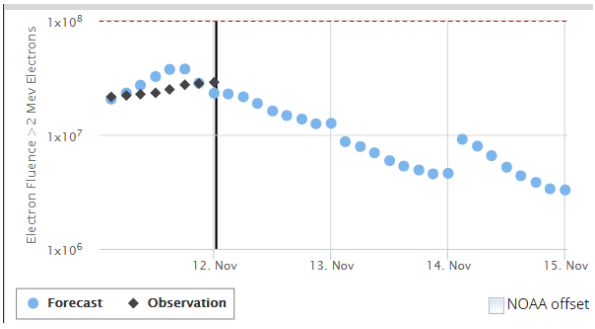
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

High Energy Electrons Event (≥ 2MeV):

The high energy (greater than 10 MeV) proton flux is expected to be at or near background levels. The high energy electron flux (greater than 2 MeV) is expected to be mainly at moderate to background levels, but with a chance of temporarily breaching the High threshold of 1000 pfu during the peak of the diurnal cycle today.
The corresponding 24-hour electron fluence is expected to continue on a steady or slightly upward trend, before declining towards the end of the period, whilst remaining below the Active (1e8 integrated pfu) threshold throughout. The overall trend pattern of the REFM forecast data seems reasonable at present, with observations close to model expectations.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ 2 MeV ≥ $1x10^8$	No	10	10	10	10
Very Active	≥ 2 MeV ≥ $1x10^9$	No	1	1	1	1

Figure 2: Met Office REFM model.



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